INTEGRATION (BM)

Find the following, Indefinite Integrals:

1. $\int (x^2 - 5x + 7)\,dx$
2. $\int (x^{1/3} + 2x^{1/2} + x^{3/2})\,dx$
3. $\int \frac{e^x \sin x + \cot x + x \sin x}{\sin x}\,dx$
4. $\int \left(5\cos x - 3\sin x + \frac{2}{\cos^2 x}\right)dx$
5. $\int \frac{dx}{\sqrt{x+1} - \sqrt{x}}$
6. $\int \tan^2 x\,dx$
7. $\int \frac{dx}{1 + \cos 2x}$
8. $\int e^{3x-1}\,dx$
9. $\int \cos^2 x\,dx$
10. $\int \sin 3x \cos 5x\,dx$
11. $\int \cos^3 x\,dx$
12. $\int x e^{x^2} dx$
13. $\int \frac{\sin\sqrt{x}}{\sqrt{x}}\,dx$
14. $\int \frac{1}{x^2} \sin\frac{1}{x}\,dx$
15. $\int x^2 \sec^2 x^3 dx$
16. $\int \cot x\,dx$
17. $\int \frac{\cot(\log x)}{x}\,dx$
18. $\int x^{1/3} \sin(x^{4/3})\,dx$
19. $\int \frac{1}{x\cos^2(\log_e x)}\,dx$
20. $\int e^x \tan e^x \sec e^x dx$
21. $\int \frac{x^2}{x^3 + 1}\,dx$
22. $\int \frac{x}{\sqrt{x^2 + a^2}}\,dx$
23. $\int \frac{dx}{x\sqrt{\log_e x}}$
24. $\int \cos^3 x \sqrt{\sin x} dx$
25. $\int x e^x dx$
26. $\int x \cos x dx$
27. $\int x\ \mathrm{cosec}^2 x\,dx$
28. $\int x^2 \log x dx$
29. $\int \log x dx$
30. $\int x \cos^2 x dx$
31. $\int e^{\sin x} \sin 2x\,dx$
32. $\int \sin(\log_e x)\,dx$
33. $\int (xe^x)^2\,dx$
34. $\int e^x \sin x\,dx$
35. $\int e^{\sqrt{x}} dx$

Find the following, Definite Integrals:

36. $\int_0^1 (4x^3 + 3x^2 - 2x + 1)\,dx$
37. $\int_0^{\pi/4} \tan^2 x dx$
38. $\int_0^{\pi/2} \sin^2 x dx$
39. $\int_0^1 e^x dx$
40. $\int_{-\pi/2}^{\pi} \cos x dx$
41. $\int_1^e \frac{\cos(\log_e x)}{x} dx$
42. $\int_0^{\pi/2} \sqrt{\cos x} \sin x dx$
43. $\int_e^{e^e} \frac{dx}{x \log_e x} dx$
44. $\int_1^{\sqrt{e}} x \log x dx$
45. $\int_0^1 \frac{2x}{5x^2 + 1} dx$
46. $\int_0^{\pi/2} \sin x \cos^2 x dx$
47. $\int_0^{\pi/2} \frac{\cos x}{1 + \sin x} dx$
48. $\int_0^1 x^3 \sqrt{1 + 3x^4} dx$
49. $\int_0^1 \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$
50. $\int_0^{\pi/2} x \cos x dx$
51. $\int_{-2}^{2} |x|\,dx$
52. $\int_{-1}^{1} \frac{|x|}{x} dx$
53. $\int_0^8 |x - 5| dx$
54. $\int_{-1}^{1} e^{|x|} dx$
55. $\int_0^5 (|x - 1| + |x - 3|)\,dx$

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ANSWERS

1. $\frac{x^3}{3}-\frac{5x^2}{2}+7x+c$
2. $\frac{3}{4}x^{4/3}+\frac{4}{3}x^{3/2}+\frac{2}{5}x^{5/2}+c$
3. $e^x-\text{cosec } x+\frac{x^2}{2}+c$
4. $5\sin x+3\cos x+2\tan x+c$
5. $\frac{2}{3}(x+1)^{3/2}+\frac{2}{3}x^{3/2}+c$
6. $\tan x-x+c$
7. $\frac{\tan x}{2}+c$
8. $\frac{e^{3x}}{3e}+c$
9. $\frac{x}{2}+\frac{\sin 2x}{4}+c$
10. $\frac{\cos 2x}{4}-\frac{\cos 8x}{16}+c$
11. $\frac{\sin 3x}{12}+\frac{3\sin x}{4}+c$
12. $\frac{e^{x^2}}{2}+c$
13. $-2\cos\sqrt{x}+c$
14. $\cos\frac{1}{x}+c$
15. $\frac{1}{3}\tan x^3+c$
16. $\log_e|\sin x|+c$
17. $\log|\sin(\log x)|+c$
18. $-\frac{3}{4}\cos\left(x^{4/3}\right)+c$
19. $\tan\left(\log_e x\right)+c$
20. $\sec\left(e^x\right)+c$
21. $\frac{1}{3}\log\left(x^3+1\right)+c$
22. $\sqrt{x^2+a^2}+c$
23. $2\sqrt{\log_e x}+c$
24. $\frac{2}{3}(\sin x)^{3/2}-\frac{2}{7}(\sin x)^{7/2}+c$
25. $(x-1)e^x+c$
26. $x\sin x+\cos x+c$
27. $-x\cot x+\log|\sin x|+c$
28. $\frac{x^3}{3}\log x-\frac{x^3}{9}+c$
29. $x\log x-x+c$
30. $\frac{1}{8}\left(2x^2+2x\sin 2x+\cos 2x\right)+c$
31. $2(\sin x-1)e^{\sin x}+c$
32. $\frac{x}{2}\left(\sin\left(\log_e x\right)-\cos\left(\log_e x\right)\right)+c$
33. $\frac{1}{4}e^{2x}\left(2x^2-2x+1\right)+c$
34. $\frac{e^x}{2}(\sin x-\cos x)+c$
35. $2\left(\sqrt{x}-1\right)e^{\sqrt{x}}+c$
36. 2
37. $1-\frac{\pi}{4}$
38. $\frac{\pi}{4}$
39. $e-1$
40. 1
41. $\sin 1$
42. $\frac{2}{3}$
43. 1
44. $\frac{1}{4}$
45. $\frac{1}{5}\log 6$
46. $\frac{1}{3}$
47. $\ln 2$
48. $\frac{7}{18}$
49. $2(e-1)$
50. $\frac{\pi}{2}-1$
51. 4
52. 0
53. 17
54. $2e-2$
55. 15

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